

Seismic Path 5 Overview

NRC Public Meeting
September 8, 2016

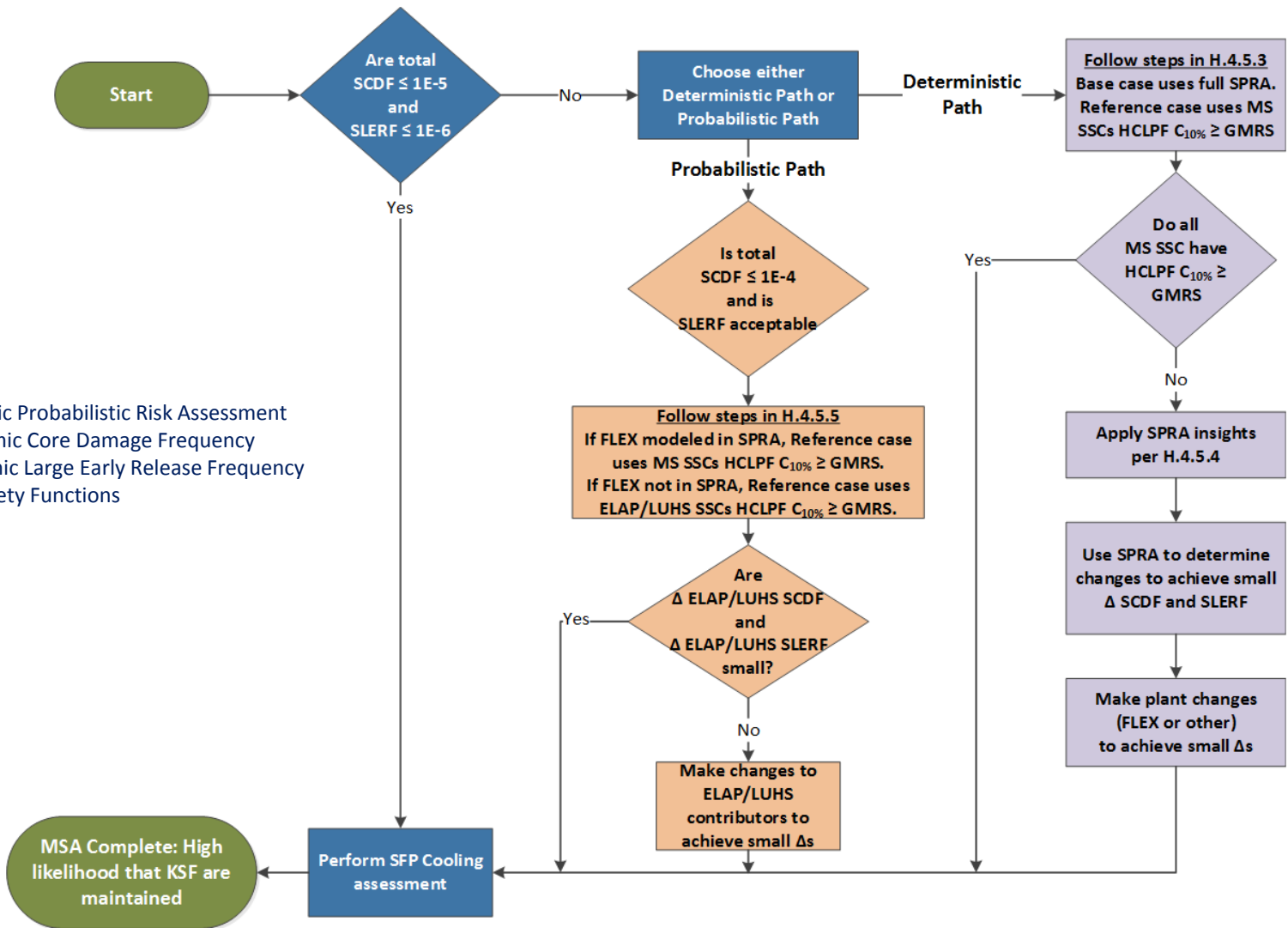
Overview

- NEI 12-06 Rev. 2 includes guidance on mitigation strategy assessments for plants with GMRS/SSE < 2 X SSE (Path 1-4)
- NEI 12-06 Rev. 3 will augment that guidance with Path 5 for plants with GMRS/SSE > 2 X SSE
- Path 5 draft provided on August 31
- Purpose: Assess the impact of the reevaluated hazard information on mitigation strategies
- Process: Can be addressed deterministically or with risk insights
- Risk-informed approach takes advantage of safety insights gained from SPRAs

Path 5 Seismic Assessments

Characteristic	NTTF Rec. 2.1 – Phase 2	MBDBE Rule
Overall Purpose	Assess plant-specific safety implication of new seismic hazard information	Establish reasonable assurance of mitigation capability of beyond design basis external hazards
Safety Focus	Identification of significant plant vulnerabilities in light of revised hazard	Applicability of revised seismic hazard to EA 12-049
Scope of Scenarios	All seismically induced core damage scenarios	Seismically induced scenarios addressed in EA 12-049/NEI 12-06, i.e., ELAP/LUHS
Metrics Used	Total SCDF/Total SLERF	<ul style="list-style-type: none"> • Total SCDF/Total SLERF • And ΔSCDF/ΔLERF for ELAP/LUHS sequences

Illustration of Overall Process



SPRA=Seismic Probabilistic Risk Assessment
 SCDF = Seismic Core Damage Frequency
 SLERF=Seismic Large Early Release Frequency
 KSF=Key Safety Functions

Overall Seismic Risk

- SPRAs provide a rigorous evaluation of plant safety in response to a severe seismic event
- For plants where the base SPRA has been peer reviewed in accordance with the SPID and accepted by NRC in response to the 50.54(f) information request:
 - If the results are less than 1×10^{-5} /yr SCDF and 1×10^{-6} /yr SLERF, the likelihood of maintaining the key safety functions of core cooling and containment integrity is high
 - In this case, modifying mitigating strategies SSCs to increase capacity does not significantly improve protection
- Since the SPRA does not include the spent fuel pool (SFP), a separate evaluation of SFP cooling is needed
- Result: mitigating strategies SSCs are reasonably protected consistent with the NRC rulemaking for mitigation of beyond-design-basis events

Deterministic Approach

- Uses the same scope as Path 4 that has been endorsed by NRC staff
- Seismic evaluation process aligned with Path 4
- Resolve conditions where SSCs identified do not meet the Appendix H performance criteria
- Separate evaluation of SFP cooling
- Result: mitigating strategies SSCs are reasonably protected consistent with the NRC rulemaking for mitigation of beyond-design-basis events

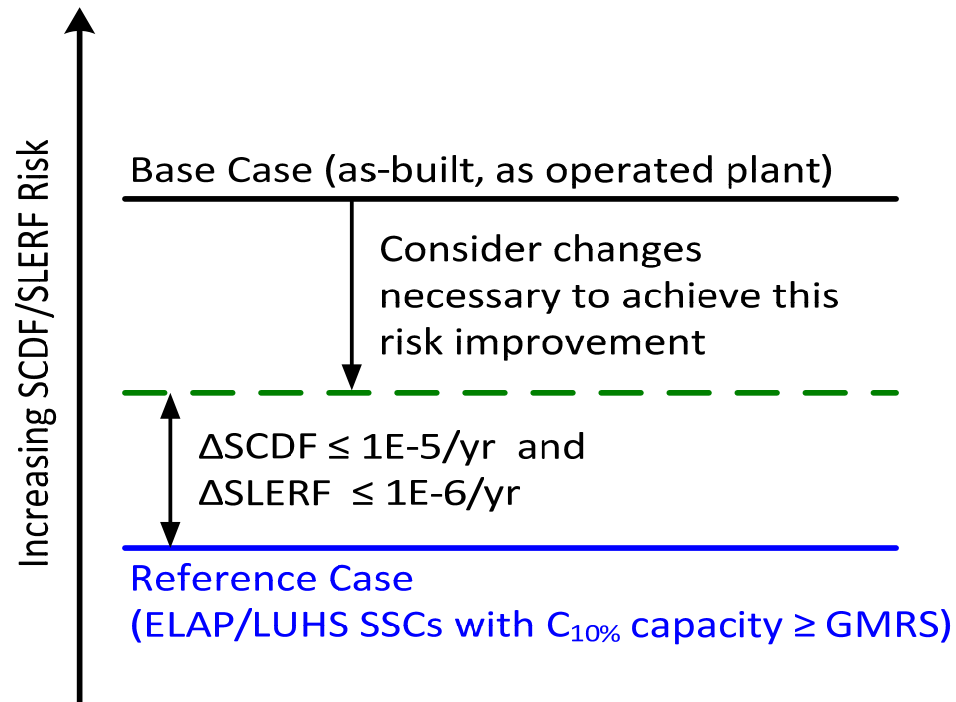
Deterministic Approach with Risk Insights

- SPRA can be used to determine whether modifications to mitigating strategies SSCs that do not meet the Appendix H performance criteria would provide a significant impact on safety
- Approach is to determine the potential risk reduction (relative to the base SPRA results) that would be obtained by modifying mitigating strategies SSCs so that their capacity meets the performance criteria
 - If this risk reduction (delta-risk) potential is low, the likelihood of maintaining the key safety functions of core cooling and containment integrity is high
 - If delta risk is not low, modifications can be defined and evaluated to reduce the base SPRA results until delta risk is acceptably low; consider
 - mitigating strategies SSCs modifications
 - plant modifications, procedure changes
- Separate evaluation of SFP cooling
- Result: high likelihood that mitigating strategies SSCs are reasonably protected consistent with the NRC rulemaking for mitigation of beyond-design-basis events

Risk-Informed Approach [Probabilistic]

- Overall plant seismic risk results from SPRA have been peer reviewed in accordance with the SPID and accepted by NRC in response to the 50.54(f) information request, and are less than 1×10^{-4} /yr SCDF and total SLERF reflects an acceptable containment seismic performance
 - Acceptability of plant seismic risk is a part of NRC's Phase 2 decision-making
- Assessment uses delta risk based upon ELAP/LUHS scenarios, which FLEX is designed to mitigate
- ELAP/LUHS scenarios are large contributors to seismic risk - mitigating strategies are targeted to address ELAP/LUHS scenarios
- If delta risk is low, there is high likelihood that key safety functions for core cooling and containment are maintained for ELAP/LUHS – FLEX continues to add defense-in-depth/safety margin, but the existing plant design provides the high likelihood of maintaining safety functions
- If delta risk is not low, options available are to model and credit FLEX, plant modifications (not limited to ELAP/LUHS) , procedure changes - re-perform delta risk calculation until delta risk is acceptably low
- Separate evaluation of SFP cooling
- Result: high likelihood that mitigating strategies SSCs are reasonably protected consistent with the NRC rulemaking for mitigation of beyond-design-basis events

Illustration of Risk-Informed Approach



Summary & Next Steps

- Summary: Path 5 approach addresses the reevaluated hazard information consistent with the NRC rulemaking for mitigation of beyond-design-basis events
- Risk-informed approach facilitates smarter plant improvements by allowing plants to credit permanent plant improvements rather than focusing solely on mitigating events after they happen
- NRC review and comment
- NEI to provide revision of Path 5 to NRC for review and endorsement